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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/763,514	01/22/2004	Susan G. Yan	GP-303570	7251

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EXAMINER	
TSANG FOSTER, SUSY N	
ART UNIT	**PAPER NUMBER**
1745	

DATE MAILED: 10/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/763,514	YAN ET AL.	
	Examiner	Art Unit	
	Susy N. Tsang-Foster	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *20040122*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 1/22/2004 has been considered by the examiner.

Specification

2. The abstract of the disclosure is objected to because it is unclear what CCDM stands for without reading the specification. It is recommended that applicant write out what CCDM stands for in the abstract. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 3 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 3 and 11 , the use of the trademark "Teflon" is indefinite because trademark compositions may vary over time. It is advised to the applicant to replace the trademark name with the generic terminology.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 2, 4, 7-10, and 14-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Yen et al. (US Patent No. 6,444,341).

Yen et al. disclose a method of making a membrane electrode assembly comprising providing a diffusion media layer (carbon paper electrode support), providing a microporous layer (sintered catalyst coat) as part of the diffusion media layer, depositing a catalyst layer on the diffusion media layer, spraying an ionomer layer on the catalyst layer, and positioning the diffusion media layer adjacent the membrane so that the ionomer layer faces the membrane (col. 7, lines 1-26).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1, 4, 6-9, 12, and 14 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Dhar (US Patent No. 5,318,863, hereinafter referred to as Dhar ('863)).

The product-by-process limitations recited in claims 1 and 8 are not given patentable weight since the courts have held that patentability is based on a product itself, even if the prior

art product is made by a different process (see In re Thorpe, 227 USPQ 964, (CAFC 1985), In re Brown, 173 USPQ 685 (CCPA 1972), and In re Marosi, 218 USPQ 289, 292-293 (CAFC 1983)).

Thus, in claims 1 and 8, the process limitation "being sprayed on" is not given patentable weight in a product claim.

Dhar ('863) discloses a membrane electrode assembly (70) in a polymer electrolyte membrane fuel cell comprising an anode side including an anode diffusion media layer (electrode 18), an anode catalyst layer 36, and an anode ionomer layer (electrolyte deposit layer 82), the anode catalyst layer being deposited on the anode diffusion media layer and the anode ionomer layer is deposited on the anode catalyst layer; a cathode side including a cathode diffusion media layer (20), a cathode catalyst layer 38, a cathode ionomer layer (electrolyte deposit layer 84) and the cathode catalyst layer being deposited on the cathode diffusion media layer and the cathode ionomer layer being deposited on the cathode catalyst layer and a membrane 90 positioned between the anode side and the cathode side wherein the anode ionomer layer and the cathode ionomer layer face the membrane (see Figures 6(a) and 6(b); col. 10, line 64 to col. 11, line 45).

As see in Figure 6(b), the anode catalyst layer is about the same size in area as the anode diffusion media layer and the cathode catalyst layer is about the same size in area as the cathode diffusion media layer. The membrane is made of NAFION which is a perfluorinated membrane (col. 7, lines 12-16).

The ionomer layer (electrolyte deposit) is made from a 5% concentrated solution of NAFION 117 and the solvent is preferably a lower aliphatic alcohol such as ethanol or isopropanol (col. 6, lines 62-68).

9. Claims 1-4, 6-12, and 14 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Dhar (US Patent No. 5,521,020, hereinafter referred to as Dhar ('020)).

The product-by-process limitations recited in claims 1 and 8 are not given patentable weight since the courts have held that patentability is based on a product itself, even if the prior art product is made by a different process (see In re Thorpe, 227 USPQ 964, (CAFC 1985), In re Brown, 173 USPQ 685 (CCPA 1972), and In re Marosi, 218 USPQ 289, 292-293 (CAFC 1983)).

Thus, in claims 1 and 8, the process limitation "being sprayed on" is not given patentable weight in a product claim.

Dhar ('020) discloses a membrane electrode assembly 5 in a proton exchange membrane electrolyte fuel cell (see abstract and Figure 1(a)). Dhar discloses that the membrane electrode assembly is manufactured by first depositing a high surface area carbon and a hydrophobic polymer (such as polytetrafluoroethylene which is also known under the trademark name TEFLON) to a substrate and sintering which inherently results in the formation of the microporous layer (see Figures 1a and 2; col. 2, lines 50-54; col. 3, lines 50-67; col. 5, lines 24-51). The substrate (18, 20) called an electrode can be carbon cloth or carbon paper which also functions as an anode or cathode diffusion media layer (col. 2, lines 53-55 and col. 3, lines 60-65). The cathode and anode catalyst layers (36, 38) are deposited onto the respective electrodes

18 and 20 (col. 4, line 29-32). The catalyst layers are also coated with solid electrolyte deposits (22 and 24) made of perfluorocarbon sulfonic acid which is an ionomer (see col. 4, lines 1-10 and Figure 1a). The electrolyte deposits 22 and 24 are placed evenly along the entire surfaces of the respective electrodes 18 and 20 (col. 4, lines 7-10). A membrane made of perfluorosulfonic acid is positioned between the two electrodes and the membrane electrode assembly is prepared by putting the components shown in Figure 1(a) together and pressing for about 90 seconds at a temperature of about 130 °C and at a pressure of 1000 psig to ensure that the two electrodes, and the electrolyte deposits (which are the anode and cathode ionomer layers) are in good contact with each other and with the membrane (col. 4, lines 35-45).

As seen in Figure 1(a), the anode catalyst layer is about the same size in area as the anode diffusion media layer and the cathode catalyst layer is about the same size in area as the cathode diffusion media layer.

10. Claims 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dhar (US Patent No. 5,521,020, hereinafter referred to as Dhar ('020)) in view of Yen et al. (US Patent No. 6,444,341).

Dhar ('020) discloses a membrane electrode assembly 5 in a proton exchange membrane electrolyte fuel cell (see abstract and Figure 1(a)). Dhar also discloses that the membrane electrode assembly is manufactured by first depositing a high surface area carbon and a hydrophobic polymer (such as polytetrafluoroethylene which is also known under the trademark name TEFLON) to a substrate and sintering which inherently results in the formation of the microporous layer (see Figures 1a and 2; col. 2, lines 50-54; col. 3, lines 50-67; col. 5, lines 24-

51). The substrate (18, 20) called an electrode can be carbon cloth or carbon paper which also functions as an anode or cathode diffusion media layer (col. 2, lines 53-55 and col. 3, lines 60-65). The cathode and anode catalyst layers (36, 38) are deposited onto the respective electrodes 18 and 20 (col. 4, line 29-32). The catalyst layers are also coated with solid electrolyte deposits (22 and 24) made of perfluorocarbon sulfonic acid which is an ionomer (see col. 4, lines 1-10 and Figure 1a). The electrolyte deposits 22 and 24 are placed evenly along the entire surfaces of the respective electrodes 18 and 20 (col. 4, lines 7-10). A membrane made of perfluorosulfonic acid is positioned between the two electrodes and the membrane electrode assembly is prepared by putting the components shown in Figure 1(a) together and pressing for about 90 seconds at a temperature of about 130 °C and at a pressure of 1000 psig to ensure that the two electrodes, and the electrolyte deposits (which are the anode and cathode ionomer layers) are in good contact with each other and with the membrane (col. 4, lines 35-45). The heating process at 130 °C would anneal the membrane electrode assembly.

As seen in Figure 1(a), the anode catalyst layer is about the same size in area as the anode diffusion media layer and the cathode catalyst layer is about the same size in area as the cathode diffusion media layer.

Dhar does not disclose that the electrolyte deposits (the ionomer layers) on the respective catalyst layers are sprayed onto the catalyst layers.

Yen et al. teach that in manufacturing membrane electrode assemblies for fuel cells, conventional techniques can be used and that the liquid electrolyte polymer formed by dissolving the polymer electrolyte in alcohol can be sprayed on with an air brush onto the catalyst layers

which are then respectively bonded to an electrolyte membrane (col. 6, lines 45-47; col. 7, lines 1-26).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to dissolve the polymer electrolyte in alcohol and spray the liquid form of polymer electrolyte onto the catalyst surfaces in order to ensure an even coat of electrolyte deposit onto the catalyst layer for improved ionic contact of each of the electrodes to respective surfaces of the membrane.

11. Claims 1, 4, 6-9, 12-16, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dhar (US Patent No. 5,318,863, hereinafter referred to as Dhar ('863)) in view of Yen et al. (US Patent No. 6,444,341).

Dhar ('863) discloses a membrane electrode assembly (70) in a polymer electrolyte membrane fuel cell comprising an anode side including an anode diffusion media layer (electrode 18), an anode catalyst layer 36, and an anode ionomer layer (electrolyte deposit layer 82), the anode catalyst layer being deposited on the anode diffusion media layer and the anode ionomer layer is deposited on the anode catalyst layer; a cathode side including a cathode diffusion media layer (20), a cathode catalyst layer 38, a cathode ionomer layer (electrolyte deposit layer 84) and the cathode catalyst layer being deposited on the cathode diffusion media layer and the cathode ionomer layer being deposited on the cathode catalyst layer and a membrane 90 positioned between the anode side and the cathode side wherein the anode ionomer layer and the cathode ionomer layer face the membrane (see Figures 6(a) and 6(b); col. 10, line 64 to col. 11, line 45).

As see in Figure 6(b), the anode catalyst layer is about the same size in area as the anode diffusion media layer and the cathode catalyst layer is about the same size in area as the cathode diffusion media layer. The membrane is made of NAFION which is a perfluorinated membrane (col. 7, lines 12-16).

The ionomer layer (electrolyte deposit) is made from a 5% concentrated solution of NAFION 117 and the solvent is preferably a lower aliphatic alcohol such as ethanol or isopropanol (col. 6, lines 62-68).

Dhar ('863) does not disclose that the electrolyte deposits (the ionomer layers) on the respective catalyst layers are sprayed onto the catalyst layers.

Yen et al. teach that in manufacturing membrane electrode assemblies for fuel cells, conventional techniques can be used and that the liquid electrolyte polymer formed by dissolving the polymer electrolyte in alcohol can be sprayed on with an air brush onto the catalyst layers which are then respectively bonded to an electrolyte membrane (col. 6, lines 45-47; col. 7, lines 1-26).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to dissolve the polymer electrolyte in alcohol and spray the liquid form of polymer electrolyte onto the catalyst surfaces in order to ensure an even coat of electrolyte deposit onto the catalyst layer for improved ionic contact of each of the electrodes to respective surfaces of the membrane.

12. Claims 5 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dhar (US Patent No. 5,318,863, hereinafter referred to as Dhar ('863)).

Dhar ('863) discloses all the limitations of claims 5 and 13 (see above) except that the ionomer layers include methanol. Dhar ('863) does disclose that the ionomer layer (electrolyte deposit) is made from a 5% concentrated solution of NAFION 117 and the solvent is preferably a lower aliphatic alcohol such as ethanol or isopropanol (col. 6, lines 62-68).

It would have also been obvious to one of ordinary skill in the art at the time the invention was made to substitute ethanol with methanol because methanol and ethanol are homologs and would have similar properties and the courts have held that compounds which are homologs (compounds differing regularly by the successive addition of the same chemical group, e.g., by -CH2- groups) are generally of sufficiently close structural similarity that there is a presumed expectation that such compounds possess similar properties. In re Wilder, 563 F.2d 457, 195 USPQ 426 (CCPA 1977).

Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use methanol instead of ethanol as the solvent in depositing the ionomer layer on the catalyst layer because methanol is a lower aliphatic alcohol with similar properties to ethanol and it is relatively cheap and readily available as an industrial solvent.

Conclusion

Any inquiry concerning this communication or earlier communications should be directed to examiner Susy Tsang-Foster whose telephone number is (571) 272-1293. The examiner can normally be reached on Monday through Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at (571) 272-1292.

The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

st/ Susy Tsang Foster

SUSY TSANG-FOSTER
PRIMARY EXAMINER